



# EO-1 Mission Autonomy Evolution

AIAA Infotech @ Aerospace 2010  
Space Autonomy Session

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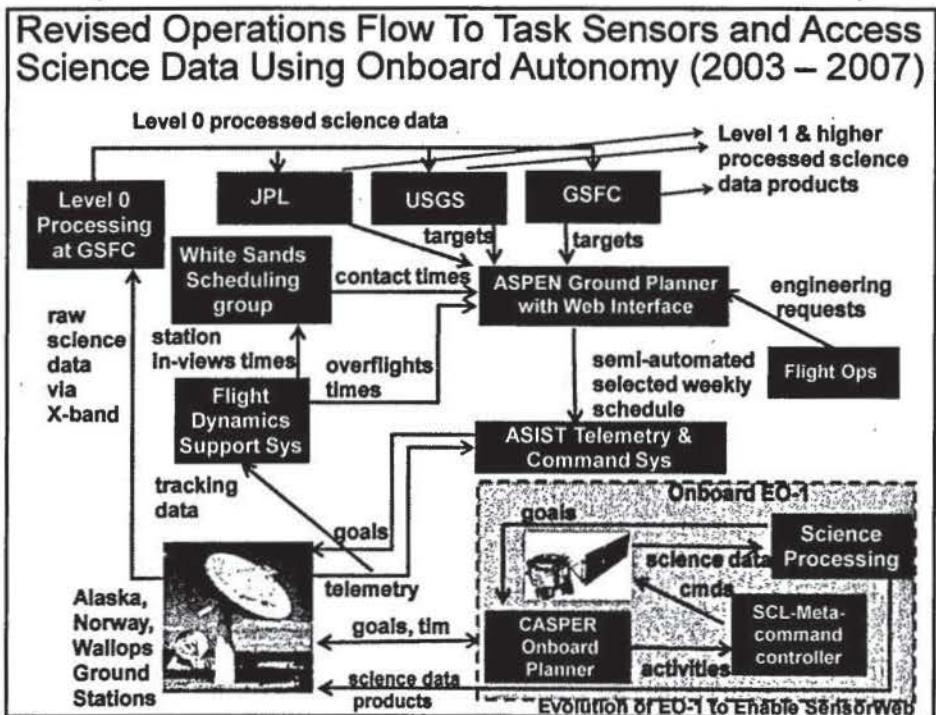
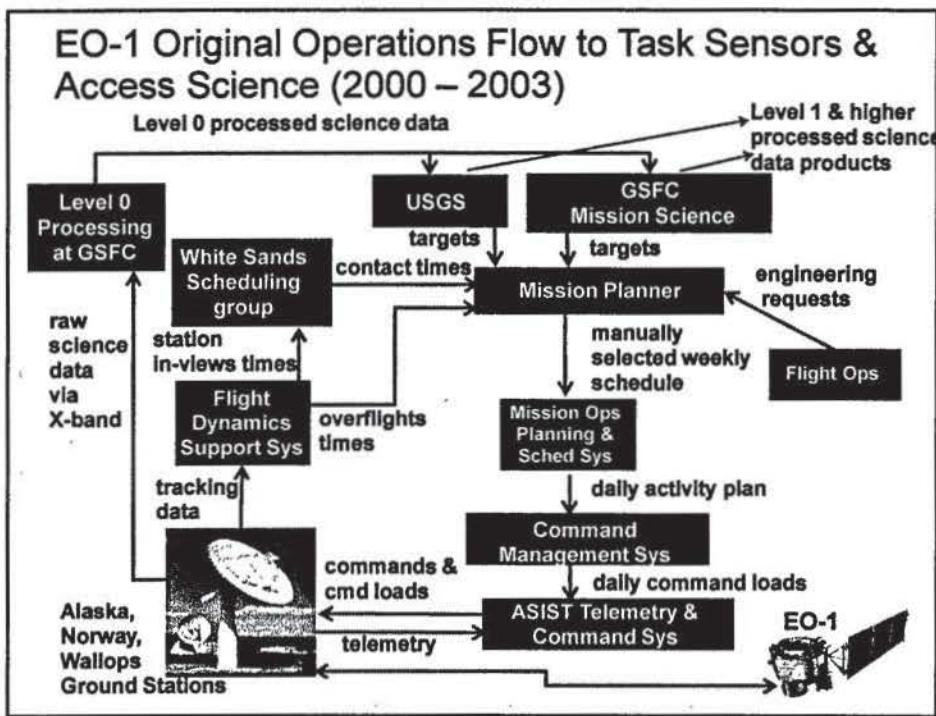
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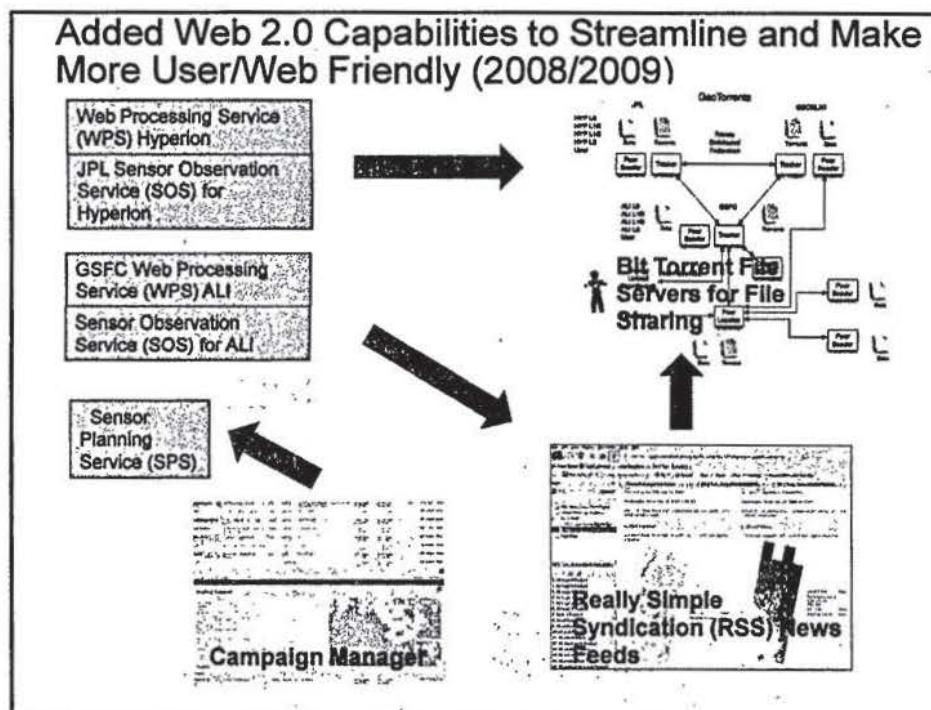
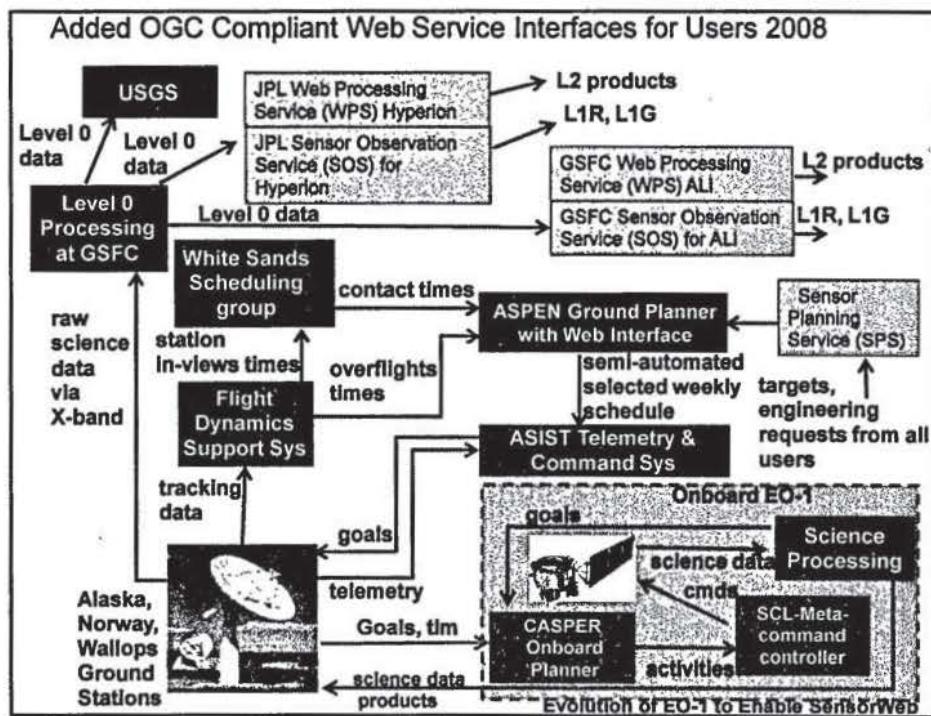
AIAA  
Infotech @ Aerospace  
2010 Conference

## Evolution of Automation and Autonomy Software on Earth Observing 1

- Streamlined Earth Observing 1 (EO-1) operations over past 10 years by integrating automation and autonomy
  - Installed Autonomous Science Experiment (ASE) flight software in 2003
  - Added Open Geospatial Consortium (OGC) Sensor Web Enablement (SWE) compatible web service interfaces in 2008
  - Added OGC compatible data processing web service interfaces and software to automate data product production 2008/2009
  - Added Campaign Manager for workflow management to orchestrate the various OGC web services and to provide greater user access to EO-1 in 2008/2009
- Experimenting with OGC standards to provide easier user access to flight software

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## Examples of Onboard Processing with Possible Autonomous Triggers



Cloud classifier

Thermal classifier for volcanoes and fires

Sulfur classifier  
added July 2007

As of July 20, 2007:  
Total Images taken for life of EO-1 mission = approx 35,000

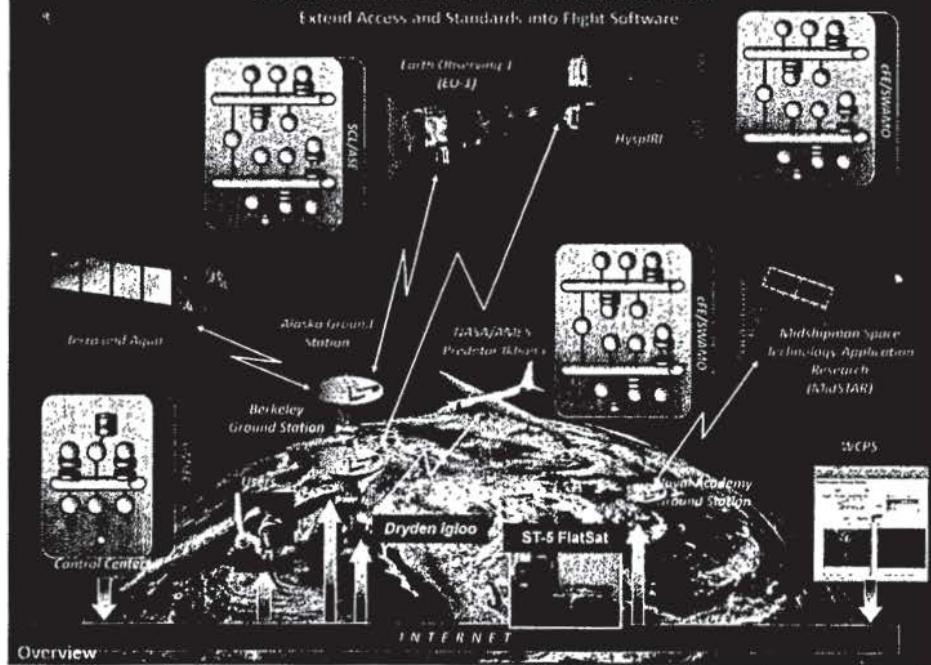
STATUS OF ABE Initiated Images

|                           | Mission | Last Week | Yesterday | Spending |
|---------------------------|---------|-----------|-----------|----------|
| Image Taken               | 11627   | 79        | 2         | 45       |
| Image Overwritten         | (837)   | 6         | 8         | 2        |
| Science Keywords Executed | 1251    | 2         | 0         | 1        |
| Positive Triggers         | 238     | 0         | 0         |          |
| Ground Contacts           | 11222   | 64        | 10        | 0        |
| X-Band                    | 3870    | 28        | 1         | 13       |
| S-Band                    | 7352    | 55        | 8         | 30       |
| Planner Code              | 9420    | 555       | 23        | 35       |

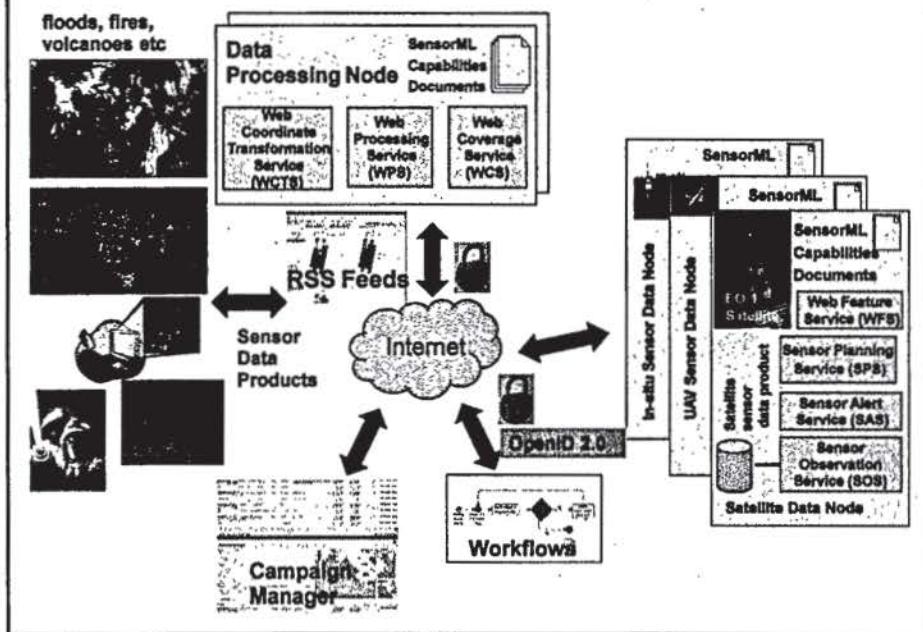
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## SensorWeb 3G in NASA SensorWeb

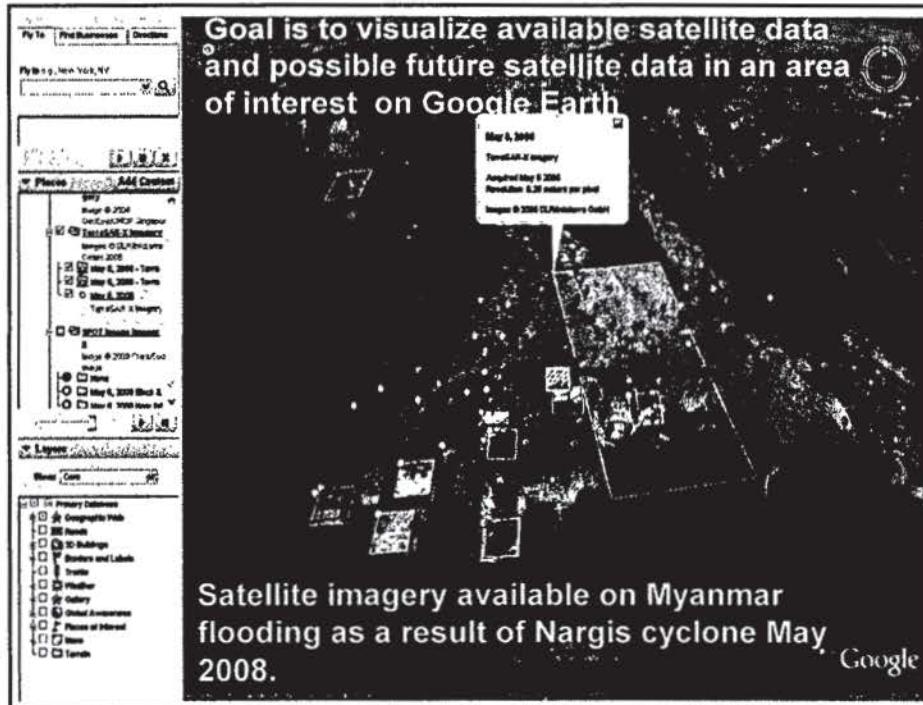
Extend Access and Standards into Flight Software



## SensorWeb High Level Architecture



Goal is to visualize available satellite data and possible future satellite data in an area of interest on Google Earth



Satellite imagery available on Myanmar flooding as a result of Nargis cyclone May 2008.

